

AVIATION

The Oldest American Aeronautical Magazine

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XXV

Special Features

Curtiss-Robertson Plant
Regarding the Stock Ledger
Selling Airplanes on a Time Basis

NUMBER
17

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AVIATION

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Index to Contents

EDITORIAL	1253
SELLING AIRPLANES ON A TIME BASIS	1254
REBUILDING THE SPARK LEADER	1256
CLINTON-ROBERTSON PLANE	1258
THE THUNDER TYPE T-2	1259
PREVENTION OF CORROSION IN AIRCRAFT	1260
THE "GRAP ZEPPELIN"	1261
NEWS SECTION	1273
THE REYNA'S LEO ENGINE	1274
SEE SIZE	1276
INDEX TO ADVERTISING	1299

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The Oldest American Aeronautical Magazine

Vol. XXV

OCTOBER 26, 1928

No. 17

The "Graf Zeppelin"

THE flight of the "Graf Zeppelin" across the Atlantic may be recorded by future historians as the most important of the trans-Atlantic flights. For the first time in history, a large number of lay passengers and also a large number of mail have flown across the Atlantic. It is enthusiastically predicted by the lighter-than-air enthusiasts, that this flight will be followed by many others on regular schedule, and that within a few years it will have been proven, without a doubt, that the giant zeppelin will not only be able to operate successfully, but also will be able to carry large loads.

It is hardly to be expected that so far as transoceanic flying is concerned, lighter-than-air craft have already shown some normal possibilities, whereas the trans-Atlantic flights by plane have gone to prove only that for the present at least such flights are absolutely impossible commercially. The Zeppelins, however, still have to prove they can operate on regular schedules and for long periods of time. True, for several seasons before the war, Zeppelins were operated over Germany on a fairly regular schedule. Operations, though, were not continued throughout the year and the flights were limited to areas fairly near the home base. Since then, enormous improvements have been made in the construction of lighter-than-air craft and especially in the knowledge of how to handle them. But due to the extreme caution that has been used in handling the "Los Angeles" many people in this country regard the suggestion that scheduled operations of lighter-than-air craft was impossible. As now as it is proved that dirigibles can be operated on a regular schedule, the public and capital will look on them as enthusiastically as they have looked on airplanes.

From the technical viewpoint, the flight is significant for two reasons. The first is the use of "blue gas," which suddenly is derived from the name of a famous celloist. It is a hydrocarbon gas of about the same weight as air so that there is no need to let out ballast gas as the fuel is consumed. The second feature is the fact that Dr. Hugo Eckener, commander of the Graf Zeppelin, instead of having his course be a study of terrestrial charts, had his course be a study of weather maps. Instead of following more or less the direct course indicated on the map Dr. Eckener followed a course based on the temperature air conditions. The accuracy of this decision was very much longer than the following air currents and the better flying conditions more than compensated for this. From point of view of the safety and from that of economy, such a fundamental course as was taken was undoubtedly a revelation, but from the point of view of speed, which after all is the primary object of flying, the trip left much to be desired.

Whether or not the trip will be the first of a series of regular commercial flights by the Germans is not known. The difficulties under which the ship was constructed, and the faith and persistence of the followers of

Count Zeppelin have been fully appreciated in this country, as shown by the enthusiastic greeting which the Graf Zeppelin received. The lighter-than-air direction will have their share during the next few years. We naturally saw these the success which they have earned through so much hard work and persistence.

Costly Delays

THERE is no doubt, that during the past year and even during the past few months, there have been very considerable delays in obtaining type certificates from the Department of Commerce. In many cases, these delays have kept up the production of planes in such a great extent that the manufacturers have lost substantial orders. Designs for new planes and plans for even minor changes in those already on the market have not been returned to the manufacturers for weeks. It is alleged that in certain cases, there were delays at months before the designs were approved. In many cases, factory engineers from far distant points had to visit Washington and spend several days before getting their plans looked over. They would leave with their plans carefully approved, but after they had left, checking by other members of the department's engineering staff, would cause further delays.

Such a condition naturally has caused a certain amount of feeling, but under the impression it was inevitable that there should be delays. Had the Aeronautics Branch of the Department of Commerce been in existence for some years, the task would have been much easier, but owing to a department in such an extraordinary condition which have existed during the past few years was an almost impossible task. The plan of all existing manufacturers had to be analyzed. In addition, almost all new plans spring up. The situation was further complicated by the fact that there was no standardization in engines, and every plane had to be passed for several different types. Besides, many of the old-time designers of commercial aircraft had methods of their own for figuring the strength of planes and left themselves completely to the Department's requirements. Actually, there have not been enough engineers who understood stress analysis to go around, and there has been competition between the industry and the government in obtaining the services of these men.

The department has taken active steps to remedy the situation, and already, there has been a considerable amount of improvement. Furthermore, however, what is needed is a more generous budget for the engineering work of the Department of Commerce. Not only must the work be done more expeditiously than it has been done in the past, but the design of getting various items in the Department, who can only agree when their interest and who cannot see any advantage in aviation, must be avoided.

1253

Selling Airplanes on a Time Basis

By WILLIAM PARKER

WHETHER or not the time payment plan of selling airplanes by the Alexander Aircraft Co., Colorado Springs, Colo., is a success, depends largely upon the viewpoint one takes of the proposition. If one views it from the standpoint of an extensive volume of sales, as might be made possible by a time payment plan, the system is not an exceptional success. But when one considers the development of the aircraft industry, the lack of volume of sales as compared to the volume of sales in the automobile industry, the risk and the high insurance rates covering the possible risks, then, the plan is obviously successful.

The Alexander plan has been effective since February 1, 1937. The incentive of demand over supply has made it unnecessary for the company to push this sales method, and it is certain that many sales, that might have been made on this plan, have been turned down by the distributors who were having difficulty supplying the demands of the cash customers.

Briefly stated the plan involves an increase of 11 per cent in the selling price over the cash price; a mortgage on the plane, and the repayment of two co-signers on the note, and a down payment of 30 per cent of the total cash selling price, with the balance to be paid in 10 equal monthly installments.

These conditions are admittedly strict, but they are necessary so on account of the risks which are not covered by insurance. The plan, admittedly is a makeshift, but will reflect upon the dangers and insurance companies get together and work out a cooperative scheme of financing and insuring planes of this type, which are far lower than present conditions warrant policies.

At first glance one might feel that the 11 per cent increase in price to installment purchasers is not so exorbitant. One must not confuse the 11 per cent of the total cash price of the plane with the 11 per cent interest on the unpaid balance. Take a hypothetical case as follows:

Cash price of plane	\$5,000
11 per cent of \$5,000	530
Total selling price on the installment plan	\$5,530

This is much different from 11 per cent interest on the unpaid balance, as the following figures show:

Cash price of plane	\$5,000
30 per cent down payment	1,500
Unpaid balance	3,500
11 per cent interest on \$3,500	385

Then the total cost would be \$1,885, plus \$3,885, plus

\$185, or \$5,955. The difference is more, to be \$165.

When one considers that under this plan the installment plan selling price is \$550 more than the cash price, one might feel that the installment purchaser would be money ahead, if he were to pay as much down as he could and borrow the remainder from the bank at a probable rate was; against rate of eight per cent. Undoubtedly the purchaser could get two co-signers to assist him to get away from the bank just as readily as he could get two



Rear quarter view of a Ryan-Singer powered Alexander Eaglevitch biplane.

co-signers on his note to the airplane distributor or manufacturer. But the banker and the co-signers would undoubtedly demand that their interests be protected by insurance, covering all of the risks in which an airplane might be involved. If the purchaser bought sufficient insurance to cover these risks he would find that the insurance premium would equal, if not exceed, the difference in the interest paid on the bank note and that on the airplane manufacturer, who assumes the risk and does not demand compulsory insurance.

The sound and financial responsibility of the purchaser and the co-signers must be of the highest sort. Either co-signer must be able by himself to pay the note in case of default of the purchaser, or the other co-signer. Credit ratings are more closely investigated than they are in the sale of many other commodities.

The Alexander company does not deal directly with the purchaser, but through the distributors. The distributor is the first to pass upon the risk. The manufacturer passes upon it, and handles the paper of the risk looks safe. If conditions are clear, or if the purchaser defaults, the manufacturer holds the distributor responsible as much the same manner that the automobile financing company turns the note back to the distributor, or the dealer, for collection or for reimbursing the financing company—in this case the manufacturer.

Thus far we have considered the time payment plan as involving, with two co-signers, 30 per cent, as a down payment. If the purchaser can pay more than in a corresponding reduction in the percentage to be added to the list price. Hereafter is a table:

30 per cent down, (cash) add 11	per cent
40 per cent down, (cash) add 9	per cent
50 per cent down, (cash) add 7 1/2	per cent
60 per cent down, (cash) add 6	per cent
70 per cent down, (cash) add 4	per cent

In all cases the cash price is the price highway, Colorado Springs.

Applications, mortgage and notes are made to the distributor. After acceptance by the manufacturer, they are submitted to the Alexander Company, which delivers the plane to the distributor or to the purchaser according to the order received.

Financing Payments with Savings of Fleet

In practically all cases where planes have been sold on the installment plan, the purchaser contracted financing the remainder of the payments by the profit, or savings of the plane, as passenger carrying activities.

"What we first put the plan into operation," explained J. A. McHenry, vice-president in charge of sales, "we realized that the purchaser was big due to the low volume of business and the benefits not covered by insurance. The Alexander Aircraft Co. does not sell to the fleet direct, sales being made to the distributor in the same manner that the automobile manufacturer sells to the distributor. This really amounts to having the Company buy the paper from the distributor, since the application is made to the distributor, and he is held responsible.

"The distributor is entrusted to investigate thoroughly both the applicant and the co-signers. By having the distributor held responsible, he naturally will take a greater interest both in collection and in servicing the customer's planes.

"The local distributor has a better opportunity to investigate the moral and financial standing of the applicant and the co-signers than has the manufacturer.

"This plan, while not wholly satisfactory, will serve as a temporary expedient until such a time as a plan similar to the present automobile financing plan can be worked out, including compulsory insurance. It is gratifying to note that such plans are now being seriously considered by various financial and insurance companies.

"Readily large volume sales, with attending large volume of production, will naturally follow a tested expedient time payment plan."

-

"If we look back into the history of the automobile, we will find that insurance premiums and time payment rates were proportionately high in the automobile plant and large volume of sales was obtained."

In further explanation of the hope of lower insurance rates and lower interest rates in installment selling, Mr. McHenry called attention to the fact that insurance rates are based upon the volume of business obtained by the insurance companies. The more planes there are to be insured, the lower will be the insurance rate. When the insurance rates and the deferred payment interest rates are materially reduced, the aircraft industry now, under-



Front quarter view of a Ryan-Singer powered Alexander Eaglevitch biplane, powered with a motor coupled engine.

note a sudden increase in the volume of business as more there will be willing to lay on the installment plan.

"Big what of the hazard and risk undertaken by the distributor and the aircraft company on the planes sold on the installment plan? There is the hazard of the plane being wrecked in the hands of a careless or unskilled pilot, and damage as occasioned by windstorms, fire and theft.

The volume of sales on the deferred payment plan has been very low, due, perhaps, to the fact that there were plenty of cash customers desiring planes as fast as the manufacturers could turn them out, and it was not necessary to estimate the installment plan purchaser. Less than one plane in 30 has been sold on installments and of this number that sold, there has been but one case where a loss has been sustained by the distributor and manufacturer, and that only a partial loss.

The application for the time plan purchase of an Alexander plane covers the applicant's history, financial resources, and his financial and moral responsibility in great detail. The application is in double pages letter form, the first sheet being filled out by the applicant. The second sheet is pre-filled and is in three column sections, each one containing the questions asked of the co-signers, with the co-signer's financial statement of assets and liabilities on the reverse side.



Front quarter view of an Alexander Eaglevitch biplane, powered with a Ryan-Singer engine.

Regarding the Stock Ledger

By EDWIN R. DOUGLAS

Consulting Engineer

THE last article discussed stock numbers for standard items and lists numbers for accessories like record receipts, deliveries, etc., of each item of stock. When accurately kept, this record serves several purposes, as follows:

(a) It shows the amount of any stock on hand, so that it may be re-ordered before it gets dangerously low.
(b) It gives figures which may be used for the annual inventory in place of an actual count.
(c) If prices are entered, it serves as the price record for costing materials drawn out for use.

(d) Sometimes it covers not only quantities and prices, but values of materials received and delivered. In this case, the figures for annual inventory are obtained very simply.

(e) By entering in it, not only receipts and deliveries, but also quantities purchased, as soon as ordered, and quantities required, as shown by specifications of production orders as soon as scheduled (and, often some time before delivery), it gives two other features which are of great value. These are "balance provided," the difference between total purchases and total requirements, and "balance available," the difference between total receipts and total requirements. The uses of these two in a complete control system will be discussed later.

Many Forms for Stock Ledgers

These stock ledgers take a variety of forms, from those which are very simple to those which are much more involved. Which at best for any given case must be decided according to local conditions. Simplicity is good, but such simplifications should not be too much sacrificed to simplicity.

The five different patterns outlined below will now be considered in order. The first is to provide notice of the necessity for re-ordering. This is an extremely important matter—the most important for which the stock ledger is ordinarily used. For this, the simplest form of ledger is ordinarily used. For this, the simplest form of ledger is ordinarily used. For this, the simplest form of ledger is ordinarily used.

This is to have in each line a loose false bottom of sheet iron, stamped with the stock number, or name of the article therein. The working stock is on top of this false bottom. Under it is placed a reserve stock, sufficient to supply ordinary requirements until a new lot can be ordered in. When the material above the false stock is all gone, the stockmaster is automatically notified that he must re-order. Indeed, he may then take the

sheet iron along with him as a memorandum, only to show it when the new lot comes in. In the case of larger articles like castings, or assemblies, the sheet iron may take the form of a false bulk or partition in the lot with reserve stock back of it. If that were the

Four blank requisition forms for "non-specified" material, such as that required for maintenance work

only purpose to be served, the use of this method would often make the stock ledger quite unnecessary.

The second purpose is that of giving figures for use in annual inventory. This also is an important matter, but can only be made use of when the ledger is not only

accurately kept, but is known to be so. So to use many stock ledgers are far from this condition. Experience has therefore made it customary to rely on the stock ledger for correct figures and return to inventory, but to take a physical recount annually and correct the stock ledgers from that. Practically, that is, the second function is not made use of because the ledger cannot be relied on. Of course the more errors that make it unreliable for inventory make it unreliable for re-ordering purposes. This is at the bottom of many cases of "material not in stock." The ledger shows it on hand, but the lot is empty.

The causes of disagreement between stock ledger and lot are:

- (1) Failure to report receipts or deliveries
- (2) Error in reporting quantities received or delivered
- (3) Error in reporting description, or stock number of materials received or delivered
- (4) Loss of tickets between stockroom and office
- (5) Failure to post reported receipts or deliveries
- (6) Error in posting quantities
- (7) Putting in the wrong amount
- (8) Error in carrying out balances on hand

These are all errors of commission, or misplacement, in the stockroom or office. The first remedy is in keeping competent and careful stockroom men and clerks. These are not necessarily high priced, but are of the temperament, quiet in conversation and takes pains with detail work. Putting persons of this kind on the job will reduce the errors greatly.

Always Make Careful Mistakes

Where as many kinds, amounts, and entries are concerned, even the best will occasionally make mistakes. The second remedy is to find and correct these mistakes as promptly as possible. The easiest of doing this is through continuous inventory. This is not the same thing as "periodic inventory." Continuous inventory means that every day, as a matter of course, the stockroom records a few items of stock and notifies the stock clerk of what he finds. Frequently, these will be items where the stock is low and must be re-ordered, although others should not be reordered. By making a rule to count a certain number of items every day, the whole stock room may be worked over two to four times per year, without hurry, in spare moments, when time can be taken and accuracy maintained. This

Two standard requisition forms for drawing current departmental supplies.

can seldom be the case in the rush and confusion of an annual inventory.

The worst will inventory an occasion, many years ago in one of the larger manufacturing companies, where an annual inventory, covering many thousands of items of stock, was taken three successive years by three different crews, the plant being shut down. None of the three agreed. The first crew counted of the regular stockroom force. The figures they turned in did not look right to the president of the company, and the plant was held shut down a few days longer, while a second crew, composed of the engineering and drafting room forces, including the writer, working day and night, made a complete recount. So great were the differences that the president and other officials of the company got on overalls themselves and did it again, with no better success. It may be laid down as an axiom that no large recount, taken under conditions of hurry and stress, can possibly be accurate.

Continuous Inventory Is Most Accurate

But many experiences with the continuous inventory, as described above, show that it does ultimately bring results that are dependable. The first time around, such a recount will usually bring to light many and large differences, the second time around, a few months later, the differences are much less, and after that, though never entirely absent, they are comparatively few and small.

Without hesitation, it is pronounced that the annual inventory should be abandoned and, in place of it, the figures of a reliable stock ledger carefully checked and increased by the process of continuous inventory should be used. Not alone is accuracy enhanced, but in place of the great expense of the annual shut-down, the cost is practically nil.

Nevertheless, there are occasions, such as at the opening up of a new stock ledger, when a wholesale inventory must be taken. The usual method has been to send six crews in hurriedly with, or count all items of stock and record them on large sheets of paper. This is the

(Continued on page 1265)

Curtiss-Robertson Plant

Buildings Were Erected, Equipment Installed and the First Plane Completed Six Months After Breaking Ground

ON March 3 of this year, ground was broken on the St. Louis Municipal Airport for the factory of the then newly organized Curtiss-Robertson Aeroplane Mfg. Co. On May 21, equipment and tools were moved in, and on August 7, the first plane was finished. Such is the record and it reflects the highly efficient organization which is behind the company.

The theory underlying the organization structure of the Curtiss-Robertson Aeroplane Mfg. Co. is rather different from that of any other airplane company. It has been contended by many that it was difficult, if not impossible, for a company manufacturing military planes to build and merchandise low priced commercial planes. But it has been acknowledged also that the manufacturers of military planes have experience and engineering facilities, which a newly organized commercial company could not acquire. The Curtiss-Robertson Company is a combination of the engineering experience of the Curtiss Aeroplane & Motor Co. and the manufacturing and merchandising experience of a group of St. Louis business men.

The president and general manager of the company is William E. Robertson, an old-time pilot who has years of experience in the buying and selling of aeronautical materials, is aerial service and in the operation of airlines. C. M. Ryan, president of the Curtiss Aeroplane & Motor Co. is vice president, and J. D. Livingston of St. Louis is secretary and treasurer. The board of directors are the above and J. A. B. Smith, treasurer of the Curtiss Aeroplane & Motor Co., F. H. Russell, vice-president of the Curtiss Aeroplane & Motor Co., Elery Hill Rolfe, of Knight, Bryant & Caville; James C. Williams, president of Jui. C. Wilson & Co., Arnold G. Seiler, of Seiler, Nussbaum & Co., and Harold H. Bedy, of the State National Bank of St. Louis.

As the company is amply financed (\$500,000 having been raised), it was possible to start with an almost ideal factory, and also to install adequate machinery as a trade for real production.

The engineering was done by the Curtiss Aeroplane & Motor Co. and the commercial planes were built at the Garden City plant. Exactly what was needed was known before the work was started at St. Louis. For the present at least, only one model is being built. This is a three-passenger cabin monoplane powered with either an OX or the Curtiss "Challenger" engine. (For detailed description see May 21, 1938, issue of AVIATION). Due to the efficient working up, all parts are made with the greatest precision. Quality has been the prime object sought after.

The manufacturing plant has, in all, 45,000 sq. ft. of floor space and is located in the north edge of the flying (Continued on page 1262)



William E. Robertson, president of the Curtiss-Robertson Company.



A line of Curtiss "Robin" fuselages wearing completion at the Curtiss-Robertson factory.

The Thaden Type T-2

An All-Metal Monoplane Similar in Design to the "Argonaut" Type With a Full Cantilever Wing and Wing Flaps

ONE of the most interesting displays at the recent Los Angeles Aeronautical Exposition was the Type T-2 all metal monoplane built by the Thaden Metal Aircraft Co. of San Francisco, Calif. The plane is the second to be built by the Thaden Company, the first being the "Argonaut" type T-1 which was constructed by the firm several months ago. A series of visiting teams made with the new plane before it was displayed at the exposition and production is to start as the immediate future.

The Thaden T-2 is a three or four passenger full cantilever wing monoplane powered with a Curtiss seven cylinder radial air-cooled engine developing 120 hp at 1,800 r.p.m. Although similar it is similar in design to the Argonaut, the outstanding differences being the full cantilever wing and the flaps on the trailing edge, which make it possible to vary the camber of the wing. A modified M.C. wing section is employed. Durakuma is used almost entirely in the construction of both planes, and the T-2, like the Argonaut, has a monocoque fuselage. The present remarkable points in the lower wing surface, developed by the Thaden Company, are also employed in the new plane, which was designed by H. V. Thaden, general manager of the firm.

The new plane has a wing span of 26 ft., a length of 25 ft. and a height of 7 ft. 9 in. It has a high speed of 125 mph. and a cruising speed of 90 mph. With wing flaps in normal position the landing speed is 35 mph. and with flaps down the plane lands at 30 mph. The rate of climb is 800 ft. per min. and the service ceiling 10,000 ft.

Multi-layer wing construction is employed in the plane producing an unusually rugged unit. The structure consists of five spans of the plate girder type with corrugated aluminum sheathing which provides drag bracing for the wing. To speed up production on their own the company has developed several types of unusual designs including a large one for wing assembly.

Static tests on the completed wings have given proof of the strength of this type of construction and in one instance a load of 10,000 lb. was applied without any indication of failure, deformation or bending or bowing of rivets. This had produced an extreme deflection of only 7 in. at the wing tips.

With the exception of the leading edge of the wing, the window openings and a few tubular members, all parts



Front view of the "Crest" powered Thaden T-2.

of the plane's structure are of corrugated aluminum. A special die has been developed by the manufacturer to form the corrugations into plane surfaces, producing an exceptionally smooth finish, and allowing minor air turbulence set up by other types of transition plates. Durakuma plate fittings attached to the wing spars and to internal stiffening members of the fuselage are coupled by twelve, one-half inch axial steel bolts, producing an effective method of wing attachment.

The fuselage construction is similar to that of the Argonaut and was introduced into this country with the earlier plane. The engine mounting is of welded steel tubing and is the only portion of the plane conforming to conventional practice. (Continued on page 1276)



A front quarter view of the Thaden T-2, which has a full cantilever wing and flaps.

Prevention of Corrosion in Instruments

By WILLIAM NELSON

Technical Consultant (CC), U. S. Army

THIS water camera, primarily, the corrosion of the aluminum instruments. Aluminum alloy, even in the form of pressings and die castings, are being used extensively, due to the great saving in weight, which is effected. The elimination of this stage is considered necessary.

To prevent corrosion in aluminum alloys, it is essential to keep them away from corroding media. The most common corroding medium is salt water, direct, or as moisture in the atmosphere. Other corroding media are relatively unimportant, here, so far as aircraft instruments are concerned. The problem, then, resolves itself into a need for preventing contact between the water and the metal of the instrument. This is not entirely practical, as other factors must be considered. The ordinary use of paint is not sufficiently effective.

The materials commonly used in instruments for surface vessels and aircraft are as follows:

1. Aluminum alloys (cast)
2. Steel (mechanical)
3. Brass (mechanical)
4. Glass (lens)
5. Rubber (gaskets)

Brass is a direct electrolytic, but steel and aluminum alloys require serious consideration. However, aluminum alloys are the most important. Corroding steel tends to make it very resistant to corrosive influences. It is desirable to continue the use of brass and steel in instruments, due to their desirable properties. Steel needs isolation in brass, corrodes very readily. If present, they should be replaced with brass screws.

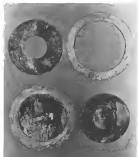
Aluminum alloys are affected most seriously when in direct contact with copper alloys in a salt water atmosphere. Aluminum alloys are anodized steel, in the most undesirable combination. Plated steel, however, is not as detrimental to the aluminum as unplated steel.

To reduce corrosion of aluminum and steel, it is necessary that the proper combination of metals be made and that the susceptible parts be given special protection. The residue of an insulant requires special attention to the metal combinations, and the outside of the instrument to the coatings to be used.

Some instruments can be made, so that they are not open to the atmosphere at any point, when others depend on openings to the atmosphere for their functioning. If it is possible, though, the mechanism should be shut off from the atmosphere by sealing the case airtight. This can be done by special precautions in the process of construction and assembly.

With regard to both watertight and non-watertight types, aluminum alloys, whenever used in instruments, must be protected by using some water-proofing com-

posed on all surfaces. Where one part comes into contact with the aluminum, preferably, it should be assembled, then, with sufficient compound between the two parts for thorough insulation, and the complete water-proofing of the case. In addition, the part assembled to the aluminum should be coated back far enough from the connection to insure the absence of electrical contact, due



A photograph showing the various parts of an aluminum instrument, which were destroyed by corrosion as the result of exposure to sea water.

to moisture. This does not apply to the lens and scale windows—these elements will be described below.

All parts in contact, whenever practical, should be of one metal. Copper alloys should never be in contact with aluminum, if steel can be used. The steel, in a case of this sort, should be provided against rust (blue oxide). But again, steel should not be used, if an aluminum alloy will do.

Watertight cases should be assembled in a dry atmosphere. Bolts should be screw type only, while rubber gaskets should be placed between the glass and the rim.

(Continued on page 1276)

The "Graf Zeppelin"

New German Dirigible is Largest Ever Constructed, Having An Overall Length of 778 Ft. and a Maximum Diameter of 100 Ft.

THIS "Graf Zeppelin" (LZ39) which was built completed the first commercial trans-Atlantic flight, is the new heaviest and most powerful rigid type dirigible to be built at the factory of the Zeppelin Corp. at Friedrichshafen, Germany. It is named for the inventor and builder of the first successful rigid airship, Count Zeppelin, and is the largest and heaviest of its type ever constructed.

In general design the LZ39 is similar to the U. S. S. "Los Angeles" or ZR-2. It is thicker and more blunt, is proportionally its length, than the earlier Zeppelin ships. The overall length is 778 ft. and the maximum diameter is 100 ft., giving a large room of 77. The maximum height is 115 ft. The total weight is 125 tons and the gross lift 307 tons. With fuel for 6,200 mi. and a crew of 36 the dirigible has fuel is 15 tons. In two flights the dirigible developed a maximum speed of 80 m.p.h. The cruising speed is 73 m.p.h.

Preliminary tests were conducted at Friedrichshafen and on the first cross-Atlantic flight on September 19, 26 persons were carried. During the test the airship was in command of Dr. Hugo Eckener, veteran Zeppelin pilot who was in charge of the dirigible on the trans-Atlantic flight. The airship is powered with five Maybach-Zeppelin "V-12" engines of special design.

The hull is of aluminum form, flow from parallel sections. The main frames are 38 angled polygons of aluminum, each 49 ft. apart with two auxiliary frames between each of the main frames. Wire bracing and long post bracing are provided for the main frames in their own planes. Both frame and longitudinal girders are constructed in sections, with circular section beams replacing the conventional Zeppelin apex angle sections. A keel framing system reinforces the four bottom ribs of each polygonal frame. The structure is covered with carefully woven cotton fabric, which is doped.

Accessories for passengers and the navigating and control cabins are provided in the nose or forward gondola, which is rigidly attached to the keel framing.



A photograph of the hull structure of the Graf Zeppelin, taken while the large airship was under construction.

The forward part of the gondola is fixed into the upward curve of the hull. The bottom of the hull is also attached into the hull. The forward portion of the nose gondola is the control room, from which an unobstructed view ahead, below, and to each side may be obtained through the large windows set at an angle. Controls are actuated by two large wheels. Switchboards controlling the ballast and water ballast valves are also provided. A telegraph system connects the control room with the engine gondolas and other parts of the ship.

Directly behind the control compartment is the ship.

(Continued on page 1275)



The Graf Zeppelin in flight near Friedrichshafen, Germany, when tests were conducted.

Graf Zeppelin Completes Trip to America in 111 Hr.

Damaged Port Stabilizer Delays Dirigible In Friedrichshafen-Lakehurst Flight

LAKEHURST, N. J.—Further proof of the commercial possibilities of transoceanic airship flights was shown when the Graf Zeppelin, captain and designer of the German-built dirigible, was landed here Monday afternoon, October 13, by Dr. Hugo Eckener, completing a 5,300 mi. trip from Friedrichshafen, Germany, in 111 hr. 38 min. The new airship, however, required more than 30 hr. additional flying time in making the flight than the ZR-1, a U. S. Navy Los Angeles, which made the same run four years ago in 79 hr. 15 min. A badly damaged port stabilizer greatly delayed the arrival in the United States.

In Buenos Aires, the Graf Zeppelin left Friedrichshafen at 2 A. M. Thursday, October 11, and headed southeast over France and Spain, to pass Gibraltar at approximately midnight. It made more directly west for the Atlantic Ocean, the Zeppelin flew as close Portugal, Madeira Island, and reached the vicinity of the Azores in the afternoon of October 12, then along the English coast to Liverpool.

Fabric Wiped in Storm

Approaching the Bermuda group on October 13, however, the storm was so violent in which the airship was disabled. Heavy wind pressure ripped two-thirds of the fabric from the lower portion of the port fin as well as a considerable portion of the upper, necessitating urgent care in the furtherance of the trip. Though the control system itself was not threatened, the stability of the ship was impaired, the flying fabric constituting a constant menace. Karl Schuler, the commander, and Dr. Eckener were ordered to land as soon as possible and on the water surface and worked for hours making temporary repairs.

Severely crippled by inefficiency of the port stabilizer, the Graf Zeppelin flew as it is now given, landed in "Gullery" in the vicinity of the Lanes to meet further repairs.

When Over Coast Cities

Five late headwinds were made, and Sunday, October 14, found the airship only a few hundred miles from Bermuda. On Monday, however, atmospheric conditions were better, and the great dirigible reached the Virginia Coast, flew over Washington, Baltimore, and Philadelphia, continued on to New York, then turned south and crossed the long river at the Baltimore River. For some hours the Graf Zeppelin was viewed to the Lakehurst base, but when the wind died down Sunday, October 14, at Trenton, the dirigible was bound in the fog along the New Jersey coast.

In her journey of 131 to 38 mi., the Graf Zeppelin set a new world record for both airship and light-airship craft. Three previous flights have been made across the Atlantic Ocean in rigid vehicles and in each case the base of the journey



The commander and his aides. Left to right: Captain Eckener, Dr. Eckener, and Captain Schuler.

Siemens-Halske Plans U. S. Engine Factory

WHEELING, W. Va.—Probably that an American branch of the Siemens-Halske airplane engine works of Germany will be established in Wheeling was said in a report to Wheeling, the past week of officials of the company.

"We are convinced we will set a branch factory somewhere in the United States," said Erwin Beckel, general manager of the airplane engine division of the company, in a statement to news writers. "It may be in the East and it may be in the Middle West."

Dr. Eckener was accompanied to Wheeling by Anton Reichenbach, chief engineer of the company, and S. G. Frank of New York City, company engineer and technical representative of the engine company in the United States.

Dr. Beckel estimated that the American branch would make the construction of 25,000,000 for buildings and equipment by the time production finally is started.

Vought Business Shows Increase

Demanded for New Amphibian Expected to Result in Further Gain

LONG BEACH, CALIF., N. Y.—A second boom in demand for V-3 amphibians, the Chance Vought Corp. of this city, showed yesterday and year profits climbed to \$440,000 during September compared to an announcement by officials of the company. The statement reflected that at a new post-war record for ship production in this country, particularly in the Coast Guard, and include the cost of ship repairs, production, or maintenance.

Also a new demand for company products was made when planes and parts valued at \$400,000 were delivered by the Vought plant during the third quarter. This is a 300 per cent gain over the entire period of 1957 and also exceeded by a small margin the third quarter of the entire first six months of 1958.

Shipments are being made at the annual rate of 25,000,000, and it has been necessary to put on a full shift in order to meet the demand for Vought airplanes. An additional 25,000 is to be of four years has been added.

The new Vought amphibian is now in production, and the demand for this new Vought amphibian that the ship department would also be expected.

Twenty Adopt Consolidated

NEW YORK, N. Y.—Twenty commercial airplane manufacturers have now consolidated under the Consolidated Light Industrial Investment Fund A, a company report stated.

Production of the Consolidated Light Industrial Investment Fund A, in recent operations in its follow-up United States Aircraft Corp., New Brunswick, N. J., Type A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ.

Represents Colombian Line

NEW YORK, N. Y.—An announcement it made by the Colombian and Ecuadorian Airway System, September 20, Barranquilla, Colombia, that the Inter-American Airways & Shipping, Inc., of New York, New York City, has been named United States general agent for the company. The Inter-American firm handles the Colombian company's air mail stamps and all postage reservations.

Merit Trophy Goes to Goebel

NEW YORK, N. Y.—Air General has been awarded the Merit Trophy and medal of \$200 in recognition of his service in the National Air Guard, according to an announcement by Arthur B. Baldwin, Inc., aviation insurance underwriters company, which offered the prize for meritorious performance.

"It is the general opinion that Goebel demonstrated more than any other pilot the intensity of his devotion to flying the same job, the same earnings every year, which experience and good flying," he said, "and President Factor."

Travel Air Producing Biplane With "Scarab"

WICHITA, KAN.—Production was started recently by the Travel Air Manufacturing Co., an airplane biplane producer, a Wichita Scarab biplane, weighing 119 hp at 3000 p.m. This plane was brought out by the company to fill the gap between the Wright Wheland and Curtiss OT-3 amphibians. A plane of this type first flew in the Class A, construction race.

The Scarab biplane plane is equipped with conventional Travel Air wings with tapered ailerons. Wings of the new type biplane developed by the company are also featured in typical equipment. Scarab is also white and gold for the Travel Air.

Performance figures: maximum speed of 165 mph and a landing speed of 3 mph. Fuel consumption at cruising speed is 5 gal. per hr. The gross weight of the plane fully loaded is 2400 lb., the weight empty, 1400 lb. and the payload, 1000 lb.

Instruments include a tachometer, oil pressure gauge, altimeter, turn and slip indicator and a radio.

German to Attend Council

WASHINGTON, D. C.—Two of Germany's leaders in the aeronautical field have accepted invitations to the Inter-American Council on Aeronautics Conference to be held here December 12-14. They are Otto Meißner, director of the Deutsche Luft Hansa, and Dr. A. K. Reichenbach, owner of the Luftfahrt Metall Apparate Co.

Kansas City to Have Meet

KANSAS CITY, MO.—The Air Corps Eastern Air Corps, Kansas City, may set aviation meet at the municipal airport on November 10. November 11 will handle the Columbia company's air mail stamps and all postage reservations.

Michigan Concern In Reorganization

Headquarters of Foster Airways Will be Moved to Detroit

DETROIT, MICH.—Reorganization of the Foster Airways, which has been operating several planes in the central section of the State of Michigan for the past few years will move the firm's headquarters to Detroit, it was announced here recently. A new line, headed by Frank M. Foster, Detroit's chief aviation officer, and former commander will take over the reins of the original Foster Airways, as the operations of William E. Foster, Detroit pilot, and Travel Air biplane. The reorganized Foster Airways will operate on a full schedule this year, now operated by Detroit's Mackay will become chief pilot in the Detroit district for the new line.

The Foster Airways, was announced, will be recognized for \$100,000 insured by a local group of firms. Don M. Hoenes, president of the Detroit Automobile and Aeronautics Council, will be vice president, insurance, and general manager. E. J. Foster will be secretary. Under the new plan the company will offer a night school, and aerial law services and school in Detroit and other sections of the state.

Expansion of Fairchild Subsidiary Announced

NEW YORK CITY, N. Y.—Announcement of the expansion of the Fairchild Aircraft Corp., Inc., of this city, was made today by William M. Fairchild, president of the Fairchild Aircraft Corp. The announcement, which was made at the company's headquarters in New York City, stated that the company had received the capital stock of Fairchild Aviation Limited of Canada (a subsidiary of the parent corporation).

Plus Factory for President

PASADENA, CALIF.—An airplane plant is shortly to be established in Pasadena, Calif., owned by the Fairchild Aircraft Corp., Inc., of New York City, according to a statement of Max S. C. Fairchild, president of the Fairchild Aircraft Corp. The new plant is a 100,000 sq. ft. plant which will be located in the vicinity of the Fairchild Aircraft Corp. plant in Pasadena.

Diplomat to Use Plane

WASHINGTON, D. C.—Maj. George H. W. Bush, military attaché at the U. S. Embassy in London, will soon have a place in his department.



The Graf Zeppelin in the night at Friedrichshafen, Germany, prior to its 111 hr. 38 min. flight to Lakehurst, N. J.

Firm Will Build DH Planes Here

Gets Manufacturing Rights For Math Craft in U.S.

NEW YORK, N. Y.—Writing that an exclusive contract for the manufacture of the DH Math has been obtained, Milton M. Warren announces the incorporation under the laws of Delaware of the Math Aircraft Corp. Mr. Warren formerly with Stone & Webster and has charge of the board of the Aero Supply Co., will be president of the concern. The Math plane is made by the De Havilland Aircraft Co., Ltd. of England.

The American company will equip the new plant places with the 285 Gohr air engine rated at 55-H.P. by The engine is a four-cylinder in line power plant which enables a cruising speed of 90-M.P.H. and a high speed of more than 110-M.P.H. Initial climb is said to be 3,000 ft. per sec. and gasoline and oil consumption is low.

Bid to Have Licensed Plane

It is understood that the Math Aircraft Corp. has leased the North & Lang plant at Milfordville, Mass., near Springfield. A bid of 200,000 acres has been obtained, it is said, for building airplanes.

Decision for sale in the Math plane will be handled by the French Marquis Ted G. de Marquis, to W. Bruce Price, president of Price, Sloan & Co., Boston investment firm. Word for the plane was likely to be handled by the Marquis Corp. & Pacific Co., of which Mr. Price is an official.

J. E. Monroe, named vice president, was formerly in charge of sales for the Willys-Morris Co., which manufactured C&G engines during the war. Frank M. Smith, formerly vice president, was formerly representative of aircraft for the Navy in New England during the war. Financing of the enterprise has been underwritten by J. A. Babier & Co., Inc., and First & Company.

Glacier Club for Portland

PORTLAND, ORE.—A Portland Branch Club club is being organized by J. W. Peterson, one of the most active members of the Auto Club of Oregon. About 50 applications for membership have been received. Headquarters for the club have been donated by the Aero club.

Large Order for OX-5 Parts

MADEIRA, MO.—Orders totaling for \$100,000 worth of new production OX-5 parts have recently been placed by the Washington-Washington Airplane Co., airplane and supply house of this city.

Travel Air Sells 34 Planes in Two Weeks

WICHITA, KAN.—Travel Air, Inc., of Wichita, has just begun to ship orders for commercial airplanes. During the past two weeks the Wichita plant has delivered 34 airplanes and completed, with a total value of \$104,015.

The first sales order was for the work order October 6, when 16 planes ranging 175,000 were delivered to customers in all parts of the country. For the week ending October 15, 18 planes out of three airplanes ranging \$13,500 each, were delivered. These total orders

Among those who received the planes are: V. Van der Horst, Bradford, Pa.; Raymond E. Smith, Kansas City, Mo.; Wilbur D. Voss, Los Angeles; Edward Brown, Salt Lake City; George A. Brown, Ames, Ia.; Arthur C. O'Connor, Chicago; Doug Clark, Austin, Tex.; Lester F. Foy, New York; E. B. Christopher, Indianapolis, Ind.; and E. W. Brown, Wichita.

Travel Air has placed bids in recent months. Ken Caper and T. A. Webb, Wichita, Travel Air, Inc., and second place, respectively, in the 40 as commercial and race at the DePaula Field last month, while Bill Caper, at a several Travel Air, was second in the Albany meet, on was also T. A. Webb Douglas, Davis, furthermore, was second in the first type plane in recent Kansas City, and Virginia Co., notes.

Second Aero Meeting Of S. A. E. Is Planned

CHICAGO, ILL.—Plans for the second annual meeting of the Society of Automotive Engineers are well advanced. The meeting is to be held here, November 5-6, during the week of the international aviation congress.

The program for the congress includes a series of talks by leading aviation engineers and scientists. The program is being arranged by the American Society of Mechanical Engineers, which is the sponsoring organization for the congress. The program is being arranged by the American Society of Mechanical Engineers, which is the sponsoring organization for the congress.

Suggests New L. A. Show

LOS ANGELES, CALIF.—Following the successful showing of the 1934 National Air Show by the California Air Race Association, California Governor Earl Warren has suggested that Los Angeles sponsor a great International Air Show to be held in connection with the 1935 Olympic Games at Los Angeles.

Clark Has Tested 667 Planes for Travel Air

WICHITA, KAN.—J. F. Clark, chief test pilot of the Travel Air Manufacturing Co., has just completed his 667th test of the 667th Travel Air plane at the factory here. This has been the last of the 667th planes for a year, meaning that he completed his 667th test of a working day for that period.

In a statement to the fact that though he had 667 tests on the company, he will be in the factory pay roll. In order that a fully qualified pilot, he kept of each Travel Air produced he reports directly



G. S. Clark

to the main office. His work of testing, therefore is complementary to that of the production department.

Mr. Clark, having associated with the Travel Air company since two years ago, is an experienced pilot and admitted through the factory to be a person capable of making a pilot.

Capital Is Increased by Two Wisconsin Firms

MADISON, WIS.—Elliott Air Transport, which operates Madison Airport, and the Madison Airport Building Co., one of the field, have completed increases in capitalization. The Elliott Air Transport has increased its capital from \$100,000 to \$150,000. The Madison Airport Building Co. has been increased to \$100,000. Both companies were originally incorporated for \$100,000.

The company has found that the increase in the business and the proper proportion for the company. The Madison Air Transport company, including its share of interest in the building of the Madison airport, has been increased to \$100,000. The Madison Air Transport has been increased to \$100,000. The Madison Air Transport has been increased to \$100,000.

Use Waste Oil For Runways

OKLAHOMA CITY, OKLA.—

A new plan for securing oil for use on runways has been developed. It is to be used on this city, it is reported. Waste oil from local garages and filling stations will be collected by city trucks and taken to the airport.

Piper Made President Of Universal Company

MINNEAPOLIS, MINN.—Loren H. Piper, president of the Universal Aircraft Corp., has been elected president of the Universal Aircraft Corp., holding membership for the Universal Aircraft Corp., Inc., and several other major airplane companies of the country.

Announcement of Mr. Piper's election follows closely on the announcement by Edward Allen Jones of the Rochester Aircraft Corp., operating on road and passenger planes between Chicago and St. Louis and St. Louis and Kansas City. The sale of about \$50,000 worth was involved in the deal.

Formerly president of the company's lines on the north will take place at once, according to Mr. Piper, the first one has been made from St. Louis to Omaha. There is also the possibility that at 100 passenger line from Omaha through Minneapolis to St. Louis will be opened in the near future, according to Mr. Piper.

Personnel Changes in Oklahoma Companies

OKLAHOMA CITY, OKLA.—James O. Haskin, formerly chief pilot for the Oklahoma Air Transport Co. of Norman, has been elected president of the Oklahoma City company. He has been elected president of the Oklahoma City company. He has been elected president of the Oklahoma City company.

Howard M. Griffin, formerly director of the Oklahoma state aeronautics commission, has been elected director of the Oklahoma City company. He has been elected director of the Oklahoma City company. He has been elected director of the Oklahoma City company.

Gets Planting Machinery

SHISHAL, MD.—Cordell, a new company, has been organized to develop the process of planting grain. It has been organized to develop the process of planting grain. It has been organized to develop the process of planting grain.

To Manufacture Convertible Plane

Knoll Craft Will Accommodate Varying Number of Passengers

WICHITA, KAN.—Wichita will have something new in the way of airplanes. The new Knoll Aircraft Corp., just chartered, will produce a plane by Knorrman model that is convertible and may be used for passenger or warplane purposes. Mr. A. Knoll, who the company is named, has designed a plane that, with minor changes, will be a four or six place plane capable of carrying mail or other cargo or which may be converted into an eight place mail.

The Knoll plane is to be built with an engine mounting that will permit changing power plants to meet different power requirements. It is to be a closed cabin plane.

In the company include Knoll are T. M. Thomas and H. P. Watson of the Thomas Aircraft Co., of Tulsa; E. J. Knoll, of Tulsa; and L. T. Cushman, of Wichita. The corporation, it is said, has been completely formed. "We expect to have the factory which running in December 1."

Mr. Knoll designer of the plane is a German. He has had experience in the designing of a series of European models which have been successful. He has been in the United States less than a year, during that time at work for the Goetz-Klein Foundation.

It was in the designing of European planes in which Mr. Knoll got the idea for the converted plane. It was necessary to convert to the Knoll plane for the Kansas State Aviation School.

Planes Sold on Time By Los Angeles Firm

LOS ANGELES, CALIF.—A last report said while in that order which 80% of all automobiles are purchased, same is true of the airplane. The Los Angeles firm of American Aircraft Corp., distributor of Waco and Lintech planes in Southern California and the Pacific Coast States.

The last plane purchased under the new plan was a Waco C-12 by the Los Angeles firm of American Aircraft Corp., distributor of Waco and Lintech planes in Southern California and the Pacific Coast States.

Win Race in Arvin

NORTHEASTON, MAINE.—Hugh Evans first pilot was won first prize in the Maine Northeaston race held recently. He flew an Aero Arvin over the course in 10 min. 15 sec. Pilot Leland of Biddeford took second.

THE BUYER'S LOG BOOK

Titterington Compensator

ALL MAGNETIC compasses manufactured by the Pioneer Instrument Co., of Roseland, N. Y., are now equipped with the Titterington Meridian Compensator. This device is a reversible magnet which makes it possible to compensate the compass by turning two sets of adjusting screws and the proper direction bearings are effected.



Pioneer magnetic compass with compensator installed in base

takes along the magnets. The movements of the tubes are controlled by the adjusting screws as the compensator comes to the base of the compass.

To secure the required amount of magnetic force, it is simply necessary to turn screws which are exposed just between the letters E-W and N-S. The upper screw manufactures magnets for covering the compass in East and West bearings, and corresponds to the fore-and-aft tube of the old type bi-magnet compass. The lower screw is used for covering the compass on North and South bearings and corresponds to the side-to-side tube of the old compass.

The process of compensation is simple and a special non-magnetic screw driver, supplied by the company, should be used. A tin blade of brass or aluminum also will serve.

Farrand Rapid Rule

AN INTERESTING and useful steel rule is being manufactured by H. A. Farrand of Berlin, N. H., and distributed by the Farrand Sales Corp., Sanger Building, New York, N. Y. This rule is compact, being contained in a small metal carrying holder, and is made of a fine grade of high carbon steel, cold-plated except for the bevels and graduations.

The Farrand Rapid Rule is a strip steel spring which when in use is held in a circular holder from which it automatically projects itself. This device is controlled by two levers attached to the holder in such a way that they may be separated between the thumb and forefinger to release the rule. The rule is pushed back into the holder by hand.

The rule is 22 in. long and may be used to measure, draw on curved surfaces having radii as low as 35 in without injury to the rule.

AC Airplane Instruments

ANIMETERS, OIL, pressure gauges and oil temperature gauges are included in the new line of aviation instruments offered by the AC Spark Plug Co., Flint, Mich. These instruments are attractive in appearance, well constructed and can be easily and quickly mounted in any instrument panel.

The accuracy is so devised that an essentially steady pointer is obtained by correct proportioning of the weight of the pointer and the strength of the magnetic fields involved in its operation. This permits of accurate reading under all conditions. The pressure gauge in from 0 to 20 amperes, charge and discharge.

Because of its reliability the Bourdon tube principle is selected for the AC oil gauge. This principle embodies a hollow metallic tube which changes its



The AC oil meter is an addition to the AC line of aircraft instruments.

shape with varying pressure. The movement of the tube is transmitted to the pointer which indicates the various pressures on the face of the instrument.

The oil temperature gauge acts on the principle of vapor pressure which it well knows for an accuracy. These products, which were recently introduced, are now being distributed through all AC Spark Plug Company jobbers.

Eno Pneumatic Cushions

AIR CUSHIONS for a variety of purposes are manufactured by the Eno Rubber Corp., 1236 South Los Angeles Street, Los Angeles, Calif., and several types are adaptable to aircraft use. Air-belt pneumatic cushions are easily inflated and when deflated can be carried in a small space. If punctured they can easily be refilled in the same manner as an auto tube.

A special Eno Air cushion known as the Aero Pilot's Seat has been developed by the company. It is a single unit, consisting of a back and seat and weighs 2 lb. 30 oz. The size of the back is 18 in. by 27 in. and that of the seat is 17 in. by 24 in. Another air-belt aircraft product is the Double Aero Transport Seat to be used in places where pilot and assistant are seated side by side. The air-belt Wedge No. 3, size 14 in. by 15 in. is also of interest to aviators. The weight of the wedge is 12 oz.

Spatial cushions also have been developed for the emergency for other chairs and driving room seats. Single Aero No. 6 is 15 in. by 18 in. in size and the Board No. 12 and 16 are 13 in. and 16 in. in diameter respectively.

The "Graf Zeppelin"

(Continued from page 1261)

or navigation room where a number of special instruments have been installed. Behind this compartment is another division containing the radio room on the port side and the galley on the starboard. The radio equipment is of modern design and consists of three distinct units. A machine and long wave telegraph transmitting set, to be used for communicating with high powered land stations and ships, and a short wave transmitting set are installed in the latter part of the compartment. It is impossible to communicate on the regular commercial channels. The third unit is installed for emergency purposes to be used if either of the others fail to function. Complete radio direction finding apparatus is included in the equipment. All galley equipment is electrically operated.

Behind the galley and radio room is the passenger stowage and dining room which are of equal size, each being 35 ft. 5 in. square. These rooms are extremely furnished and nothing contributing to the comfort of passengers has been omitted. Lending style from the dining and reception rooms is a central console, providing access to the two double berthed sleeping compartments and two lavatory rooms, and terminating in a passage way to the crew's quarters and the stowage space for passengers, mail and baggage provided inside the hull framing of the hull.

A main gangway runs along the hull framing from stern to bow and from this, branch gangways provide access to the engine propulsion. A control fire and air pump way is located just below the longitudinal center line of the hull and extends across to the midships. There are 30 in. of hydrogen buoyancy gas, and the remaining hydrogen contains the blue gas used for fuel. This is a hydronium gas having a specific gravity of 1.04 to 1.08. The blue gas was developed by Hermann Blas of Ludwigshafen, Germany, who was associated with Julius Fiebig in the development of hydronium gas. This gas was chosen by Zeppelin engineers, because of its low specific gravity which gives it a distinct advantage over liquid fuel for dirigibles where variations in fuel composition due to the great weight of the ship and necessitates making hydrogen to maintain equilibrium. In the Graf Zeppelin, the gas used is replaced by air as it is consumed, resulting in a negligible variation in the gas weight.

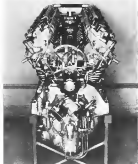
The power plant of the LZ129 consists of five specially developed Maybach-Zeppelin VL-2, 12 cylinder, water-cooled, Vee type, engines each developing 550 hp. These engines are located in midships position along both sides of the hull in such positions that there is no interference in the separate slip streams. Two pairs are placed almost beneath the hull, and one pair above the hull near the stern. These engines each weigh 2,450 lb., and although their weight per horsepower is greater than that of surface engines, they are more economical in fuel consumption.

The VL-2 is a development of the type of Maybach-Zeppelin engines known as the Gas engine, the difference being found in the construction and the compression, which is higher, and in the introduction of aluminum pistons. These modifications result in greater output. At the altitude of Friedrichshafen, the engines developed 540 hp at 1,680 rpm. At sea level the engines develop 500 hp.

One of the outstanding features of the VL-2 is its direct reversibility. The reversing gears which usually are necessary, with surface engines, for maneuvering, are eliminated. A considerable reduction in the weight of the

power plant is thereby effected, and the engine installation can be made much lighter. The new type engine is reversed by a simple shifting of the gas shaft, which changes the timing of the 26 combustion valves. This is the only modification needed by the reversal. A compressor or supercharger, which has been developed to a high degree of efficiency, is used to crank the engine in either direction.

The VL-2 has been adapted to powers far in excess of the throttle values of the Maybach engines. Combustors of which there are four, one to each three cylinders. Pipes from the gas bags lead into these valve shafts, and an adjustable valve controls the flow of gas in accordance with the position of the throttle. Another



One of the Maybach-Zeppelin "VL-2" engines which power the giant "Graf Zeppelin."

valve inserted in the fuel line permits a change from constant to liquid fuel, or vice versa, in a few seconds without interrupting the operation or making any change in the engine. Liquid fuel consumption of the VL-2 at full load averages 402 lb. per hp. hr. which is somewhat lower than the ordinary airplane engine.

The crankshaft arms on seven main roller bearings and on a combined main and thrust bearing. These bearings are a recent development of the Maybach Company and are employed throughout the engine, except for the wrist pin. The use of these new anti-friction bearings contributes largely to the long life of the engine and the length of time between overhauls. It is estimated on the basis of tests conducted at Friedrichshafen, that the engine will need minor adjustments only once in every 7,000 hr. and that major overhauling will be necessary but once in 10,000 hr.

Spray lubrication is employed in the VL-2 with one oil pressure pump and two sump pumps, one at each end of the crankcase so the drainage can be made regardless of the angle at which the ship is inclined. One intake and two exhaust valves serve each cylinder, and

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Specifications

Wing Span	1,000 in.
Wing Area	31 sq. ft.
Wing Load	31 lb. sq. ft.
Length	21 ft. 4 in.
Wing Area	1,000 sq. ft.
Seating Capacity	8 Passengers

Performance

High Speed (Sea Level)	111 m.p.h.
Cruising Speed	111 m.p.h.
Landing Speed	41 m.p.h.

Power Plant

Engine	Wasp
Displacement	401
Fuel Capacity	100 gals.
Oil Capacity	17 gals.

Equipment

Starter, Brakes, Wheel Propellers, Clutch, Air Speed Indicator, Navigation Light, Tailwheel, Altimeter, Clock, Fuel Indicator, Fuel Oil Pressure, and Oil Temperature Gauge, Air Corps Theories, Rudder and Tail Vane, Exhaust Manifold, Cabin Heater.

Price, \$18,500

Factory at Felt, Marysville, Mich.

Buhl Aircraft Company
MARYSVILLE, MICHIGAN

are operated from a common carburetor between the two cylinder banks. Ignition is provided by two Robert Bosch magnetos.

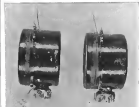
Instead of a large quantity of water ballast, which is ordinarily used in air ships, and gradually is dropped to compensate for buoyancy lost due to the inevitable escape of the lifting gas, the LZ127 carries approximately eight tons of gasoline. When it becomes necessary to lighten the ship, gasoline is used for ballast, enough has been conserved to decrease the weight sufficiently to obtain the desired buoyancy. The reduction in weight of fuel carried compensates for the greater weight of the engine, especially on the long trips for which the Graf Zeppelin is designed.

The general specifications of the LZ127 are as follows:
Overall length 778 ft.
Maximum diameter 100 ft.
Maximum height 111 ft.
Fuel capacity 100,000 gal.
Displacement 3,710,000 cu. ft.
Maximum speed 80 m.p.h.
Cruising speed 73 m.p.h.
Power plant (5 Maybach VI-2 engines) 2,750 hp.
Cruising range 11,000 mi. (at 7,000 ft.)
Crew (normal) 30
Passenger capacity 20
Gross lift 137 tons
Designed payload 45 tons

Prevention of Corrosion in Instruments

(Continued from page 126)

The threads ought to be greased with some rust preventive compound, and should be drawn up hand tight. For shipment and storage, coupling connections should be capped with steel or aluminum alloy caps, and the threads



Two instruments, specially prepared, after 19 days' exposure to a salt spray. The photograph shows how corrosion was resisted.

greased with a rust preventive compound. A complete coat of waterproofing compound for the exterior, in addition to any already applied, completes the job. Paints, along the edges of screw connections, can be used.



The American Mark Monoplane which won first place in the Los Angeles to Cincinnati Air Derby

Another Warner Victory

Warner "Scarab" Powered Planes, after taking the first four places in the Class A New York-Los Angeles Air Derby, and after winning the closed course race at the National Air Races, captured

FIRST PLACE SECOND PLACE THIRD PLACE

in the Class A Los Angeles to Cincinnati Air Derby, concluded Sept. 13. For an unusual achievement covering both performance and stamina, this Warner accomplishment is unparalleled in the history of this type of engine.



Dept. of Com. Certificate No. 2

Place	Plane	Pilot	Engine
1	American Mark	Robert DeLo	Warner "Scarab"
2	Stinson, Jr.	C. W. Stephens	Warner "Scarab"
3	Challenger	Ted Kenyon	Warner "Scarab"

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if the connections are not broken after the painting is completed.

Non-water-tight instruments should be provided with free ventilation inside. Drainage is a necessary feature. Most of the holes, provided for connection with the atmosphere, are small, and permit capillary attraction. If it is possible to enlarge these holes, the increased ventilation should result in less corrosion.

All parts of an instrument, which can be coated, should be painted for permanent protection. The cases must be well coated, if they are to be preserved in service. Experience indicates, that the best results are to be obtained by using lubricating materials, liberally applied to the mechanisms, where this material will not interfere with the operation of the instrument, a considered worthy. Bearings and parts not painted should be oiled. Protection should be made for alloy while in service.

Any instrument, which becomes submerged in water, should be completely disassembled, and dried without delay. Corrosion may begin within twenty-four hours, and if corrosion is once started, difficulties will ensue.

To install an instrument in a plane, these rules should be followed:

- (1) Use aluminum alloy, or steel bolts.
- (2) Grease the threads of the bolts thoroughly.
- (3) Use couplings of aluminum alloy.
- (4) Grease the threads of the couplings thoroughly.
- (5) Do not break and of damaged parts of an instrument, except when necessary.
- (6) Any painted surface should be touched up with an approved enamel.

The Thaden Type T-2

(Continued from page 1259)

tend from the nose of the engine mounting past all openings in the monocoque structure to the aft end of the cabin. Ahead this point, the internal bracing is strictly transverse, provided by duralumin tube bulkheads riveted to the skin. These are placed closer together toward the tail to strengthen the shell against landing shocks transmitted through the tail steel. Bulkheads are also provided at the front and rear of the cabin, the forward one being cut out to allow easy access to the pilot's seat. This type of fuselage has proved to be very rigid both in flight and on landing, and in one test a one-ton weight was placed on the tail without the slightest deformation. The landing gear has a true airfoil section which is said to contribute to the lift. Both wing and fuselage are exceptionally well streamlined presenting a clean appearance and showing high aerodynamic qualities.

The Thaden T-2 is the first plane of American manufacture to utilize wing flaps to produce variable camber. These flaps are of triangular section, duralumin sheathed, and occupy all of the trailing edge except the portion where the ailerons are attached. They are actuated by a wheel and worm gear built into the lower portion of the wing structure just above and to the right of the pilot's seat. In extreme upper position they conform with the normal curve of the wing and permit of maximum speed. Downward deflection results in increased lift and any intermediate position can be held freely because of the worm gear arrangement. The flaps represent approximately 5 per cent. of the total lifting surface and downward the landing speed by approximately 9 mph. Ailerons and other control surfaces are similar in construction to the flaps and are actuated by horns and steel cables operating over cambered sheaves. The rudder is 10 per cent. balanced, the stabilizer is adjustable in flight and the fin is adjustable on the ground. All con-

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tail surfaces were tested to 25 per cent overload. Aisle height and full legroom are afforded in the comfortable cabin which is furnished in sumptuous fashion, the pilot's section being lined with terrace plate and the passenger compartment upholstered in mohair. Both are well insulated and the interior color is steel gray throughout. The length of the cabin (including pilot's compartment, is 8 ft., the width 3 ft., 4 in., and the height 4 ft., 11 in., easily opened, plate glass windows are provided on each side of the cabin. The forward end is almost entirely of glass offering unusual visibility ahead to the sides and below to a point inside and considerably to the rear of the wheels. A sliding glass panel over the pilot's seat provides visibility above and, while designed for an emergency exit, it is conveniently located, that it will prob-



Side view of the latest Thorion all-metal monoplane, powered with a "Cater" 150 hp radial engine.

ably be used by the pilot in preference to entering and leaving the plane through the cabin. The mounting on which this panel moves is such that the natural pressure of the air stream tends to hold the panel in place rather than to move it. Another point of utility to the automobile is found in the seating arrangement. A wide and comfortable lounge seat extending the full width of the cabin and accommodating two persons is placed at the rear. In the forward part a leader seat is provided for the pilot at one side and at the other side a folding seat is placed and may be used when it is desired to carry an extra passenger or a child pilot. A large luggage compartment is built into the luggage structure behind the cabin.

Conventional stick and rudder pedals are employed in the control system and in production planes a second cockpit and an additional set of pedals will be provided for instruction and other purposes. There is, however, only one control for the wing tips.

The usual flap control is mounted between the pilot and engine compartments and the engine mounting is so designed as to allow any access to the rear of the power plant when it is necessary to adjust or repair carburetor, magnets or starter. The exhaust pipe is sunk into the cowling to reduce parasite resistance but an air channel is provided around it to prevent overheating.

The power plant is so placed that the plane shows remarkable stability and balance in flying. A motor propeller is used as standard equipment. Fuel supply of 40 gal. is carried in the two wing tanks over the wing and accessible through cover plates. An emergency tank of 10 gal. capacity feeds directly to the carburetor eliminating the necessity of a forced landing if the fuel supply from the main tanks is stopped.

Landing gear of the split axle type is provided and is built of heat-treated chrome molybdenum steel tubing with Genoa shock absorbers inserted in the compression members. Brakes wheels and brake units are used and the brake control is so adjusted that either or both brakes may be applied at will. A tail spring is used to absorb tail wheel landing shocks. The landing gear, tail



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On September 3rd, Vern Roberts, test pilot for Mono-Aircraft, Inc., accompanied by Dr. (Scooter) Bermood, service man for Velie radial motors, left Moline, Illinois, for Los Angeles in the Mono Coupe. Their itinerary during three days totaled twenty-three hours and thirty minutes of flying and twenty-three hundred miles.

The Velie M3, air-cooled, radial, equipped with the new Stromberg carburetor, used twenty gallons of gasoline and two gallons of oil in this twenty-three hundred mile trip across desert and mountains.

Twenty-five miles per gallon of gasoline (less than four gallons of gasoline per hour)

making ninety gallons of gasoline at 25c and 2 gallons of oil at \$1.00, the entire trip cost \$24.50 at \$12.25 for each of the two passengers. This is undoubtedly the most economical form of transportation the world has ever known.

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hood, door handles and control horns are the only accessories protruding beyond the outline of the plane, all other parts being streamlined into the structure.

The specifications furnished by the manufacturer are as follows:

Span	39 ft.
Length	28 ft.
Height	7 ft. 9 in.
Chord (Maximum)	8 ft.
Wing area (including flaps and ailerons)	126 sq. ft.
Flap area	21½ sq. ft.
Address area (excluding ailerons)	10 sq. ft.
Elevator and stabilizer area	30½ sq. ft.
Rudder and fin area	11½ sq. ft.
Power plant	Curtiss
Horsepower (at 2,000 r.p.m.)	150 hp. at 1,800 r.p.m.
Fuel Capacity	50 gal.
Oil Capacity	6 gal.
Speed, maximum	121 mph
Cruising	90 mph
Landing, flaps up	55 mph
Landing, flaps down	45 mph
Rate of climb, sea level	800 ft. per min.
Service ceiling	25,000 ft.

Curtiss-Robertson Plant

(Continued from page 1281)

field. There is a railroad siding at the rear of the buildings. As will be seen from the diagram, there are a number of separate buildings connected by a wide passageway through which the product flows, arranging parts from the buildings as either side. This system of separate buildings not only greatly decreases the fire hazard,



A diagram showing the arrangement of the buildings and the production route at the Curtiss-Robertson plant.

but facilitates the ultimate expansion of the plant. The two main structures are of the hangar type of construction with doors the full width of the building facing out on the field. All buildings are fireproof and are fitted with elaborate sprinkler systems. Heating is done by radiators hung from the walls through which air is blown by fans.

The hangar and aerial working shop is 232 ft. long and 60 ft. wide. The end near the railroad siding contains the aerial store room and the engine shop. All gusset and flat metal parts are stamped out by special chaps. Where parts are to be made in the metal, there are either punches as an integral part of the die, or special drilling jigs are made up so as to insure absolute accuracy. Forgings have been used quite extensively and many

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parts, which in many places are made up of individual joints welded together with the welds subject to tension, are in the Curtiss "Huber" a single forging machined to shape. All the tubular members of the fuselage are cut in jigs and are stored in racks convenient to the assembly point. The assembly of the fuselage and the metal control surfaces is all done in usual jigs, which hold the pieces in their proper places. In the fuselage construction, the bottom and top are built first, and then the two are welded together.

All parts are being made up in lots of 100. About \$30,000 has been spent in standard machinery and about \$50,000 in special tools, dies and jigs. The second equipment is being charged off at the rate of \$100 per plane. An example of these special tools is the rib stamping



One corner of the wing construction department in the Curtiss-Robinson factory.

die. This machine cost approximately \$100,000 against the \$100 or so that is spent in making up a jig for wooden ribs. A light weight, well made wooden rib will take as much as two hours to make. The stamped metal rib can be turned out by two men at the rate of 60 in an hour, or some easy time as that.

When the metal work of the fuselage is completed it is wheeled through the corridor past the wing department and the dope house into the rear of the assembly hall. This building is 235 ft long and 80 ft wide. Here the controls and seats are put in and the fabric is put over the panel frame work. It is then returned through the corridor to the dope room, where the dope and paint are applied. When this is finished, the plane is moved through the central corridor to the forward part of the assembly building, where the wings are put on and are lined up, and the final adjustments are made before the plane is wheeled out to the flying field for test.

The wing working department building and the dope and painting building are situated on either side of the corridor which connects the metal and fuselage shop and the final assembly shop. The painting and dope rooms have been laid out with very great care. There are ducts on the floor through which the air is sucked out at a rapid rate. In the spray rooms, the air flows rapidly from front to rear where it is sucked out by an ingenious venturi tube arrangement, which keeps the dope lathered air from going through the fan which circulates the air.

The wood working shop is well equipped, but has a normal layout. Due to the fact that the ribs are of stamped metal, the work is continuously cut down. The spars consist of a web, or board, with reinforcement glued and nailed on either side of the top and

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We teach you the fundamentals of the industry, the principles of flight, the principles of navigation, the principles of communication, the principles of maintenance, the principles of repair, the principles of inspection, the principles of safety, the principles of discipline, the principles of organization, the principles of management, the principles of leadership, the principles of initiative, the principles of responsibility, the principles of integrity, the principles of honesty, the principles of loyalty, the principles of patriotism, the principles of citizenship, the principles of character, the principles of conduct, the principles of behavior, the principles of attitude, the principles of motivation, the principles of inspiration, the principles of innovation, the principles of invention, the principles of discovery, the principles of progress, the principles of achievement, the principles of success, the principles of happiness, the principles of fulfillment, the principles of meaning, the principles of purpose, the principles of vision, the principles of faith, the principles of hope, the principles of love, the principles of peace, the principles of justice, the principles of freedom, the principles of democracy, the principles of capitalism, the principles of socialism, the principles of communism, the principles of fascism, the principles of nazism, the principles of militarism, the principles of imperialism, the principles of colonialism, the principles of racism, the principles of sexism, the principles of homophobia, the principles of transphobia, the principles of ableism, the principles of ageism, the principles of classism, the principles of sexism, the principles of heterosexism, the principles of monosexism, the principles of cissexism, the principles of transphobia, the principles of lesbophobia, the principles of gayphobia, the principles of bisexualphobia, the principles of pansexism, the principles of polysexism, the principles of 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Shepard Sectional Steel Airplane Hangars



Can be quickly erected with unskilled labor. Steel rods and gusseted plates joined in air-tight sections in shop before shipment then quickly erected under any conditions. No erecting, leveling, bracing, or other work and built on concrete, gravel and tracks, apply road sheets and glue the ends and building is ready for business.

ARTHUR B. SHEPARD CORP.
11 Broadway, New York
Shops at Irvington, Newark, N. J.

AVIATION
October 30, 1928

or visible released variety. For large ledgers machine putting is very good. Any of the bookkeeping machines, or adding typewriters, are applicable to the purposes so far considered. The ledger form that will be a card, or sheet, filed vertically in a suitable posting rack or binder. One clerk, with the machine, will do the work of several putting by hand.

With any of these forms and methods, the posting clerk notes his own balance after each debetion and, when that falls below the set minimum, gives notice for re-ordering. Thus, re-ordering depends on the quantity actually on hand in the bin, after material is physically delivered. When no placing system exists, this is the best that can be done, but the possibility is evident that, with an apparent sufficiency of material on hand as shown by the ledger, or by inspection of the bin, there might be several production orders issued that would call for considerably more material than was on hand, and some of

DATE		ORDER NO.		QUANTITY		REMARKS	
DATE	ORDER NO.	QUANTITY	REMARKS	DATE	ORDER NO.	QUANTITY	REMARKS
10/1/28	1000	100	100	10/1/28	1000	100	100
10/2/28	1001	100	100	10/2/28	1001	100	100
10/3/28	1002	100	100	10/3/28	1002	100	100
10/4/28	1003	100	100	10/4/28	1003	100	100
10/5/28	1004	100	100	10/5/28	1004	100	100
10/6/28	1005	100	100	10/6/28	1005	100	100
10/7/28	1006	100	100	10/7/28	1006	100	100
10/8/28	1007	100	100	10/8/28	1007	100	100
10/9/28	1008	100	100	10/9/28	1008	100	100
10/10/28	1009	100	100	10/10/28	1009	100	100
10/11/28	1010	100	100	10/11/28	1010	100	100
10/12/28	1011	100	100	10/12/28	1011	100	100
10/13/28	1012	100	100	10/13/28	1012	100	100
10/14/28	1013	100	100	10/14/28	1013	100	100
10/15/28	1014	100	100	10/15/28	1014	100	100
10/16/28	1015	100	100	10/16/28	1015	100	100
10/17/28	1016	100	100	10/17/28	1016	100	100
10/18/28	1017	100	100	10/18/28	1017	100	100
10/19/28	1018	100	100	10/19/28	1018	100	100
10/20/28	1019	100	100	10/20/28	1019	100	100
10/21/28	1020	100	100	10/21/28	1020	100	100
10/22/28	1021	100	100	10/22/28	1021	100	100
10/23/28	1022	100	100	10/23/28	1022	100	100
10/24/28	1023	100	100	10/24/28	1023	100	100
10/25/28	1024	100	100	10/25/28	1024	100	100
10/26/28	1025	100	100	10/26/28	1025	100	100
10/27/28	1026	100	100	10/27/28	1026	100	100
10/28/28	1027	100	100	10/28/28	1027	100	100
10/29/28	1028	100	100	10/29/28	1028	100	100
10/30/28	1029	100	100	10/30/28	1029	100	100
10/31/28	1030	100	100	10/31/28	1030	100	100

A stock card ledger form for hand putting. These could be delayed until more could be ordered in. To prevent such shortages under this plan, the amounts must be set high, sufficiently so to cover unusual requirements, and this leads to high inventories.

If not physical withdrawals, but prospective requirements could be used as the basis, this method would become feasible as soon as the specifications of the production orders were issued and checked. Material could be ordered weekly, perhaps before the physical work demands would be made. Shortages would not result, while still the stock maximum and the requirements would remain low. This is the object behind the fifth possible one that can be made of the stock ledger.

For this, we must enter in the ledger not merely physical receipts, deliveries, and takings, but also physical requirements, and the balances provided are available. If this permits substantial reduction in stock, unnecessary with an added risk of shortages, it may be well worth the additional clerical work.

The substance between these different quantities are as follows:

(a) Purchases less	(b) Receipts less	(c) Requirements	(d) Deliveries
equals	equals	equals	equals
(e) Balance Provided	(f) Balance Available	(g) Balance On Hand	

A form of ledger sheet or card for using them, by hand putting, is also shown above, with a number of hypothetical entries on it to illustrate the system.

If the entries on this sheet be followed through, it will be seen that on 1/5/28 (line 3), although there were

AVIATION
October 30, 1928

Place Your Reservations Now for the Chicago Show Issue of AVIATION Dec. 1, 1928



AVIATION
The Older American Aeronautical Magazine

AVIATION'S issue of December 1, will be devoted to the International Aeronautical Exposition to be held in the Coliseum, Chicago, December 1 to 9, under the auspices of the Aeronautical Chamber of Commerce.

To benefit most from the wide spread interest which unquestionably will be created by the Chicago exposition, whether you are an exhibitor or not, your name and products should be placed before the aircraft buying public in AVIATION, the publication that is preferred by those actually engaged in aeronautical activities.

Place your reservations for advertising space NOW.

AVIATION'S International Aeronautical Exposition is now set for November 1, 1928. Last advertising closes will close November 25. The closing date for your required proofs is November 25. Prompt reservations will secure a favorable position. Write or wire today AVIATION PUBLISHING CORPORATION, 204 West 37th Street, New York City.

MILESTONES OF PROGRESS

When We Say "Tuesday" We Don't Mean "Friday"

SWALLOW dealers have learned that they can depend upon delivery promises made by Swallow. Exact production schedules, made possible by the most modern manufacturing methods, insure "on time" deliveries to our dealers and customers.

Prompt deliveries mean satisfied customers—and more profits for the dealer. Write or wire us for more details regarding the money-making Swallow dealerships.

SWALLOW AIRPLANE CO.
WICHITA, KANSAS

TABLE TWO (for continuing AVIATION)



Ireland Flying Boats

The demand for flying boats for use by commercial operators and engineering operators has caused us to develop our entire production facilities during the balance of this year to construct of this type.

Practically the same ship as the successful Ireland Amphibian but with certain improvements which puts the Ireland Flying Boat in a class all by itself. Of course powered with the dependable Wright Whirlwind. Seats five.

Write for complete details

IRELAND AIRCRAFT, Inc.
Curtiss Field, Garden City, N. Y.

IDECO STEEL HANGARS

For building an airport or a private landing field IDECO is ready to furnish hangars, shops, offices, visiting rooms and other buildings, landing lights, beacons, floodlights and radio towers and any of the various structural material necessary to a modern airport or complete airway. Both in the matter of planning and building such equipment, IDECO engineers are at your service.

INTERNATIONAL ENGINEER & EQUIPMENT COMPANY

Columbus, Ohio

Portland, Ore.

HALL-ALUMINUM AIRCRAFT CORPORATION

Strong, Light Weight

ALL-METAL
*Airplanes, Seaplanes,
Flying Boats and Floats*

*Standardized Drawn Sections and
Stamped Parts Adaptable to Your
Present Designs or New De-
signs Supplied*

2050 ELMWOOD AVENUE
BUFFALO, NEW YORK

Contractors to U. S. Navy

SEAMLESS STEEL TUBING

All Aircraft Grades

*WAREHOUSE STOCKS FOR IMMEDIATE
SHIPMENTS in any quantity.
MILL REQUIREMENTS for individual
production requirements.*

SERVICE STEEL COMPANY
31 E. First St. 1415 Franklin St. 2518 Alameda St.
CINCINNATI DETROIT LOS ANGELES

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**NEW
PRODUCTION**

**IMMEDIATE
SHIPMENT**

Contractors to U. S. Army and Navy

VAN SCHAACK BROS. CHEMICAL WORKS
2316 AVONDALE AVE. CHICAGO, ILL.

SIDE SLIPS

By ROBERT R. OSBORN

An item from an aeronautical magazine describes a new airport recently acquired by Long Island, New York. "A new security area airport has been opened here at the foot of Grove St., east of Playfield Park. Two runways, each 20,000 feet long have been installed. We suppose all that extra acreage not used in the runways will be sold off into farms."

"Airplane Radiator Fouled, May Be From 'Dewar,' Mrs. Grayson's Craft"—*Headline*
As the ill-fated "Dewar" was fitted with two "Wartwoods," this is certainly a reasonable deduction, my dear Watson, a most remarkable deduction.

One good sign, which indicates that the present aviation boom will probably be a permanent one, is the fact that the local airport has already become a political issue. The latest pages of newspapers from all over the country are already featuring photographs of very barren and desolate looking country with the subtitle: "This is the airport" as which Mayor Jones wishes to spend \$2,500,000 of the taxpayers' money." or "Here is the future and easy development which the city council is preparing for Joe Smith, the graft king—the 'airport' temporarily loaned to the city." When local aeronautical developments are accepted for exploitation by the local politicians on the state basis as the sewage system, paving projects, city hall developments and prohibition enforcement, then we can be assured that our present prosperity is not a mere flash in the pan.

The Interjet Aviator paid us a visit the other day and had to be told that Commander Byrd was working some sort of a ferry service to this South pole here in fact that seems to be the only explanation of the fact that he has sailed from the United States at least once a week for the last two months.

Suggestions for a newspaper headline to be permanently set-up and always ready for instant use:—
"Endurance Plane Flies Now Antwerp"

We read that the latest ship of the Byrd Expedition is following these orders which have sailed ahead of it, and is loaded with sheep, cows, explosives, airplanes, polar transportation equipment and other supplies. This news certainly is a terrible blow to the thought we have elevated since earlier, fine-moral days, that the only equipment required for an exploring expedition was some boots for tramping with the natives.

The judges have unanimously selected as this week's Automating Aeronautical Event the story of the night mail pilot who started for Cleveland from New York and headed to Connecticut, because a large quantity of mail in his cargo had thrown his compass out of adjustment. The championship is still held by Mr. Leavins, however, who will be remembered as having attempted to fly from England to India instead of to America, because "the weather was better in that direction."

BLACK & DECKER

No. 1 ELECTRIC TOOL CHEST

\$43.⁵⁰



This Chest Contains:
Black & Decker Light-Duty Quarter-Inch Electric Drill, Bench Stand for both grinding, buffing and sanding, set of twist drills up to 1/2 inch, wire wheel for wire and paint removing, rag buffing wheel, grinding wheel, and sanding disc.

AN Electric Tool Chest for drilling holes in metal, fibre or wood, also for light grinding, buffing or sanding. The Bench Stand, which is a part of the equipment, can be screwed to your work-bench and, by means of a thumb-screw, the Electric Drill may be quickly fastened to the Bench Stand so that grinding, buffing and sanding operations can be performed on the work-bench.

This Electric Tool Chest is almost as indispensable piece of equipment around the Airplane Hangar, where there are such a multitude of small repair and maintenance jobs to be done. The very handy metal chest makes it possible to keep all Twist Drill, Grinding Wheels and attachments under one cover, where they are always at hand when urgently needed.

* * *

Write for complete catalog of Black & Decker Portable Electric Tools, Electric Grinders, Electric Sanders, Electric Saw Drivers and other Portable Electric Drive Tools for the aviation field.

BLACK & DECKER

Toronto, Ontario

TOWSON, MD., U. S. A.

Slough, Bucks, England

THANK YOU for mentioning AVIATION

WRIGHT PATTERNS *are made by Master Craftsmen*

BEFORE engineering ideas represented by a blueprint can be reduced to tangible form—before the metals can be poured which give the engine its light weight and enduring strength—patterns for each casting must be carefully made. Patterns on which will depend the form of the casting—the accuracy of its weight and dimensions—the very success of the engine itself!

Behind the perfection exemplified in Wright patterns, stand long years of training and experience—years that have resulted in a thorough knowledge of the trade.

It is that knowledge

that guides the tools of Wright craftsmen, modeling intricate designs in wax and clay, perpetuating them in wood and metal. With skillful precision allowance is made for the contraction of the cooling metal—provision is made for the surplus to be later removed in machining—every part so formed that the resulting mould or core may have adequate strength to withstand the flow of molten metal.

Time taking, costly work...but time and cost can not be considered in attaining and maintaining Wright standards—standards paralleled only by Wright performance.

*More ships
More Pilots fly them!*

WRIGHT

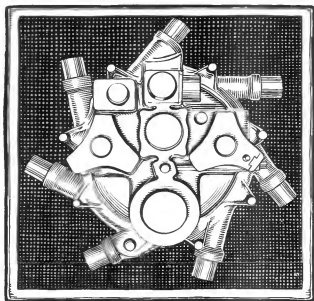
WRIGHT AERONAUTICAL CORPORATION

Paterson, N. J., U. S. A.

CANADIAN WRIGHT LIMITED, Sole Licensees for Canada, Montreal

AUTHORIZED PARTS DEALERS

Air Associates Inc.—Curtis Field, Long Island, N. Y. Pacific Aeromotive Corp.—Los Angeles, Cal. Stout Air Services, Inc.—Dearborn, Mich.



that guides the tools of Wright craftsmen, modeling intricate designs in wax and clay, perpetuating them in wood and metal. With skillful precision allowance is made for



Wright "Cyclone"
Aeronautical
Engine



Wright "Whirlwind"
Aeronautical
Engine